2005

FANS 01247 - Geographic Information Systems (GIS) CVS Application

Fanshawe College

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ONTARIO COLLEGES OF APPLIED ARTS AND TECHNOLOGY

CREDENTIALS VALIDATION SERVICE

APPLICATION FOR PROGRAM VALIDATION

This proposal will be sent to MTCU for Approval for Funding __x___YES _____ NO

1. College: Fanshawe
2. College contact person responsible for this proposal: Name: Frank Rodgers Title: Chair, Art & Design Division Telephone: 519 452 4228 Electronic mail: FRodgers@fanshawec.ca
3. Proposed Program Title: Ontario College Graduate Certificate in GIS
4. Proposed Credential: (please indicate below) Local Board Approved Certificate ☐ Ontario College Certificate ☐ Ontario College Diploma ☐ Ontario College Advanced Diploma ☐ Ontario College Graduate Certificate X
5. Proposed Program Outcomes: Please complete and attach the two Program Maps (Appendix A - Form 1 and Form 2)
6. Proposed Program Description: Please complete and attach the Program Description Form (Appendix B)
7. Proposed Program Curriculum: Please complete and attach the Program Curriculum Form (Appendix C)

8. Date of Submission:
9. Date of CVS Response:
10. Validation Decision: ☐ Proposal Validated (APS Number:) ☐ Proposal not Validated. Reason: _____ _____ Signed on behalf of CVS:

Send the completed form and required appendices to: klassen@collegecvs.on.ca For detailed information on how to complete the Application for Program Validation, please refer to the Instructions for Submission document. For any additional information contact: College Credential Validation Service, 655 Bay Street, Suite 400, Toronto, ON M5G 2K4; or by telephone at (416) 596-8799

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APPENDIX A - PROGRAM MAPS

(Vocational Program Outcomes & Essential Employability Skills Outcomes)

Vocational Program Learning Outcomes:

Form 1(attached) is provided to assist you in mapping your proposed program vocational learning outcomes against existing vocational outcomes found in either Provincial Program Standards or in Provincial Program Descriptions.

Where there is a relevant Provincial Program Standard, the approved Vocational Learning Outcomes must appear in the first column, followed by your proposed program vocational learning outcomes.

Where there are no Provincial Program Standards, the first column will contain program outcomes from the Provincial Program Description. Again, your proposed program vocational learning outcomes will be added in the middle column.

NOTE: *Both these types of documents can be obtained from staff at the CVS or at the Colleges Branch, MTCU.*

The last column will contain a list of the relevant curriculum proposed in your program to address the outcome in a manner that ensures the graduate will have reliably demonstrated the required skill or ability. Course numbers or course codes, corresponding to those provided in your list of courses (Appendix C), are sufficient in this column.

Essential Employability Skills Outcomes:

A mapping of the Essential Employability Skills (EES) will be done on Form 2 (attached).

The instructions / requirements for this map are the same as for the Vocational Program Map. The first three columns contain the approved skill categories, the defining skills, and the EES learning outcomes. The last column will contain the proposed curriculum (as listed in Appendix C) that will ensure the meeting of these outcomes.

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APPENDIX A - PROGRAM MAPS

Form 1 - Vocational Program Outcomes

PROVINCIAL PROGRAM STANDARD VOCATIONAL LEARNING OUTCOMES / PROVINCIAL PROGRAM DESCRIPTION OUTCOMES	PROPOSED PROGRAM VOCATIONAL LEARNING OUTCOMES	COURSE TITLE / COURSE CODE (From Appendix C)
Not Applicable	1. Create solutions to spatial problems utilizing database systems;	Fundamentals of GIS; Information Systems; Advanced Analysis in GIS; Web GIS
	2. Apply spatial analysis techniques within a variety of disciplines;	Fundamentals of GIS; Remote Sensing; Advanced Analysis in GIS; Web GIS
	3. Solve problems using data that is acquired, interpreted, and integrated from various sources, and	Fundamentals of GIS; Information Systems; Spatial Data Acquisition;

	with different formats and coordinate systems;	Remote Sensing; Advanced Analysis in GIS, Web GIS
	4. Generate elegant and efficient computational algorithms;	Programming Basics-OOP; Advanced Programming-OOP; Web GIS
	5. Configure and customize GIS applications, operations, and databases to support decision-making and modelling within a range of disciplines;	Fundamentals of GIS; Programming Basics-OOP; Advanced Analysis in GIS; Advanced Programming-OOP; Web GIS
	6. Design web-based and embedded solutions to distribute GIS data and functionality to a wide range of end users;	Programming Basics-OOP; Advanced Programming-OOP; Web GIS
	7. Integrate GIS component design and development into project life cycle management, systems life cycles, and workflow processes;	Information Systems; Spatial Data Acquisition; Programming Basics-OOP; Advanced Programming-OOP
	8. Assist end users in integrating spatial processes into primarily non-spatial software applications;	Fundamentals of GIS; Information Systems; Advanced GIS
	9. Communicate complex technical geographic information to a wide variety of clients using texts, maps, and visual display, in order to increase understanding and enable wider use of GIS applications;	Fundamentals of GIS; Information Systems; Remote Sensing; Advanced Analysis in GIS; Web GIS
	10. Practice to a professional standard, through ethical behaviour, continuous learning, and	All courses

	participation in professional organizations.	

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APPENDIX A - PROGRAM MAPS

Form 2 - Essential Employability Skills Outcomes

SKILL CATEGORIES	DEFINING SKILLS Skill areas to be demonstrated by the graduates	ESSENTIAL EMPLOYABILITY SKILLS OUTCOMES The graduate has reliably demonstrated the ability to:	COURSE TITLE / COURSE CODE (From Appendix C)
COMMUNICATION	• Reading • Writing • Speaking • Listening • Presenting • Visual Literacy	➢ communicate clearly, concisely, and correctly in the written, spoken, and visual form that fulfils the purpose and meets the needs of the audience	Fundamentals for GIS; Advanced Analysis in GIS; Web GIS; Remote Sensing
		➢ respond to written, spoken, or visual messages in a manner that ensures effective communication	Fundamentals for GIS; Advanced Analysis in GIS; Web GIS; Remote Sensing

SKILL CATEGORIES	DEFINING SKILLS Skill areas to be demonstrated by the graduates	ESSENTIAL EMPLOYABILITY SKILLS OUTCOMES The graduate has reliably demonstrated the ability to:	COURSE TITLE / COURSE CODE (From Appendix C)
NUMERACY	• Understanding and applying mathematical concepts and reasoning • Analysing and using numerical data • Conceptualizing	➢ execute mathematical operations accurately	All courses
CRITICAL THINKING & PROBLEM SOLVING	• Analysing • Synthesizing • Evaluating • Decision-making • Creative and innovative thinking	➢ apply a systematic approach to solve problems	All courses
		➢ use a variety of thinking skills to anticipate and solve problems	Information Systems; Programming Basic-OOP; Advanced Programming-OOP; Analysis in GIS; Remote

SKILL CATEGORIES	DEFINING SKILLS Skill areas to be demonstrated by the graduates	ESSENTIAL EMPLOYABILITY SKILLS OUTCOMES The graduate has reliably demonstrated the ability to:	COURSE TITLE / COURSE CODE (From Appendix C)
			Sensing
INFORMATION MANAGEMENT	• Gathering and managing information • Selecting and using appropriate tools and technology for a task or a project • Computer literacy • Internet skills	➢ locate, select, organize, and document information using appropriate technology and information systems	All courses
		➢ analyse, evaluate, and apply relevant information from a variety of sources	All courses
INTER-PERSONAL	• Team work • Relationship management • Conflict resolution • Leadership • Networking	➢ show respect for the diverse opinions, values, belief systems, and contributions of others	Fundamentals of GIS; Advanced GIS; Spatial Data Acquisition; Remote Sensing; Web GIS
		➢ interact with others in groups or teams in ways that contribute to effective working	Fundamentals of GIS; Advanced GIS; Spatial Data Acquisition;

SKILL CATEGORIES	DEFINING SKILLS Skill areas to be demonstrated by the graduates	ESSENTIAL EMPLOYABILITY SKILLS OUTCOMES The graduate has reliably demonstrated the ability to:	COURSE TITLE / COURSE CODE (From Appendix C)
		relationships and the achievement of goals	Remote Sensing; Web GIS
PERSONAL	• Managing self • Managing change and being flexible and adaptable • Engaging in reflective practices • Demonstrating personal responsibility	➢ manage the use of time and other resources to complete projects	All courses
		➢ take responsibility for one's own actions, decisions, and consequences	All courses

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APPENDIX B - PROGRAM DESCRIPTION

PROGRAM DESCRIPTION: (including occupational areas where it is anticipated graduates will find employment)

This eight month intensive Graduate Certificate program prepares graduates for employment in a wide range of land-based industries that utilize spatial and tabular data. The program is project-based, software-intensive, interdisciplinary, and focused on building flexible, current, high-end applied skills. Students will gain mastery of foundational GIS skills and apply leading-edge techniques in GIS Science to create spatial solutions. Remote sensing, object-oriented programming, spatial analysis and modeling, digital photogrammetry, web map/ web GIS and CAD skills will all be developed, and students will have the opportunity to apply these technical skills to their own areas of specialization (engineering, social sciences, humanities, community health or other sciences). Graduates may work as GIS application specialists, GIS programmer analysts, GIS analysts, or in related occupations in both the public and private sectors.

VOCATIONAL PROGRAM LEARNING OUTCOMES: (vocational program learning outcomes must be consistent with the requirements of the Credentials Framework for the proposed credential)

The graduate has reliably demonstrated the ability to:

1. Create solutions to spatial problems utilizing database systems;
2. Apply spatial analysis techniques within a variety of disciplines;

3. Solve problems using data acquired, interpreted, and integrated from various sources, and with different formats and coordinate systems;

4. Generate elegant and efficient computational algorithms;

5. Configure and customize GIS applications, operations, and databases to support decision-making and modeling within a range of disciplines;

6. Design web-based and embedded solutions to distribute GIS data and functionality to a wide range of end users;

7. Integrate GIS component design and development into project life cycle management, systems life cycles, and workflow processes;

8. Assist end users in integrating spatial processes into primarily non-spatial software applications;

9. Communicate complex technical geographic information to a wide variety of clients using text, maps, and visual display, in order to increase understanding and enable wider use of GIS applications;

10. Practice to a professional standard, through ethical behaviour, continuous learning, and participation in professional organizations.

ADMISSION REQUIREMENTS:

Any degree or diploma with a minimum B average /3.0 GPA in the graduating year; computer literacy strongly recommended

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APPENDIX C - PROGRAM CURRICULUM

Semester	Course Code*	Course Title (and brief course description)
1		**Fundamentals of GIS** This course consists of a theory and computer lab portions. In the theory portion GIScience is studied. In the computer lab portion, a series of exercises will introduce the student to GIS software. The acquisition, processing, storage, display and basic analysis of spatial and tabular data will be mastered.
		Information Systems The structure and theory of relational database management systems are studied. The interrelationship between RDBMS and GIS is explored through the use of case studies. Spreadsheet and database software are used to create, store, manage, and query tabular data. Special emphasis will be placed on the structure and design of spatial geodatabases.
		Programming Basics-OOP This is an introductory course to the elementary aspects of object oriented programming languages such as C#, C++ and VB.Net.. The relationship of programming to GIS software will be examined to show how user-written programs may enhance such pursuits as GIS analysis and GPS data acquisition.
		Spatial Data Acquisition Spatial data is acquired using GPS equipment and then applied to the ortho-rectification of digital aerial/satellite images. Three-dimensional models of the resulting corrected data are created, manipulated and used to create contour base maps.

2		**Remote Sensing** This course examines aspects of remote sensing for the purposes of digitally processing images of our world for the GIS industry. Image classification systems and techniques are applied to various commonly available forms of remotely sensed data. Integration with GIS of the resulting analyses is performed along with data correction and quality assurance. Practical applications are utilized in a computer laboratory setting.
		Advanced Analysis in GIS This is an advanced level continuation of the first semester fundamental GIS course using advanced analysis methods in multivariate spatial analysis, network analysis, and 3D modelling.
		Advanced Programming-OOP This is an advanced level continuation of the introductory course in object oriented programming. Problem-solving skills, as applied to GIS, GPS and internet technology, are honed by examining examples from industry and through the development of progressively more complex programming applications.
		Web GIS This lecture/lab based course provides the fundamental principles of developing Web based GIS applications. The focus will be on Web GIS design, the distributing of GIS data over the web, server and client side scripting, and customization of commercially available web GIS automation tools.

Add additional rows as required to complete the curriculum chart.

* **(be sure to identify those courses designed to deliver General Education)**

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APPENDIX A - PROGRAM MAPS

Form 1 - Vocational Program Outcomes

PROVINCIAL PROGRAM STANDARD VOCATIONAL LEARNING OUTCOMES / PROVINCIAL PROGRAM DESCRIPTION OUTCOMES	PROPOSED PROGRAM VOCATIONAL LEARNING OUTCOMES	COURSE TITLE / COURSE CODE (From Appendix C)
. Be capable of designing and executing, in a progressive manner, algorithms and programs to handle spatial data and associated hardware devices in a programmatic environment of a GIS; Understand the typical data structures, algorithms, and computational problems that are encountered in various GIS technologies;	1. Create solutions to spatial problems utilizing database systems;	Fundamentals of GIS; Information Systems; Advanced Analysis in GIS; Web GIS
. Be aware of the variety of sources of spatial data, such as surveying and remote sensing, that feed into a GIS, and the methods by which these data are realized in a GIS system;	2. Apply spatial analysis techniques within a variety of disciplines;	Fundamentals of GIS; Remote Sensing; Advanced Analysis in GIS; Web GIS

Understand the ways in which GIS technologies can be applied within specific disciplines (see assumption above), and the advantages, changes in method, developmental problems, and restructuring that may result from the adoption of these technologies		
. Input, store, manipulate, and retrieve this type of data in a computer based environment demonstrating an understanding of the general concepts of spatial information and the current methodologies; . Be aware of the variety of sources of spatial data, such as surveying and remote sensing, that feed into a GIS, and the methods by which these data are realized in a GIS system;	3. Solve problems using data that is acquired, interpreted, and integrated from various sources, and with different formats and coordinate systems;	Fundamentals of GIS; Information Systems; Spatial Data Acquisition; Remote Sensing; Advanced Analysis in GIS, Web GIS
. Understand the typical data structures, algorithms, and computational problems that are encountered in various GIS technologies; . Be capable of designing and executing, in a progressive manner, algorithms and programs to handle spatial data and associated hardware devices in a programmatic environment of a GIS;	4. Generate elegant and efficient computational algorithms;	Programming Basics-OOP; Advanced Programming-OOP; Web GIS
. Understand the ways in which GIS	5. Configure and customize GIS applications,	Fundamentals of GIS; Programming

technologies can be applied within specific disciplines (see assumption above), and the advantages, changes in method, developmental problems, and restructuring that may result from the adoption of these technologies;	operations, and databases to support decision-making and modelling within a range of disciplines;	Basics-OOP; Advanced Analysis in GIS; Advanced Programming-OOP; Web GIS
Be capable of generating a plan for the design, implementation, and operation of a proposed GIS systems for a typical industrial client or group, and executing this plan as a demonstration project.	6. Design web-based and embedded solutions to distribute GIS data and functionality to a wide range of end users;	Programming Basics-OOP; Advanced Programming-OOP; Web GIS
. Be capable of designing and executing, in a progressive manner, algorithms and programs to handle spatial data and associated hardware devices in a programmatic environment of a GIS;	7. Integrate GIS component design and development into project life cycle management, systems life cycles, and workflow processes;	Information Systems; Spatial Data Acquisition; Programming Basics-OOP; Advanced Programming-OOP
. Be aware of the issues surrounding the communication of data extracted from a GIS to a variety of potential end users;	8. Assist end users in integrating spatial processes into primarily non-spatial software applications;	Fundamentals of GIS; Information Systems; Advanced GIS
. Be aware of the issues surrounding the communication of data	9. Communicate complex technical geographic	Fundamentals of GIS; Information

extracted from a GIS to a variety of potential end users;	information to a wide variety of clients using texts, maps, and visual display, in order to increase understanding and enable wider use of GIS applications;	Systems; Remote Sensing; Advanced Analysis in GIS; Web GIS
N/A	10. Practice to a professional standard, through ethical behaviour, continuous learning, and participation in professional organizations.	All courses